REMARKS

Claims 1-20 are pending.

Claims 1-20 stand rejected.

Claims 1, 2, 4, 6-14, 17, and 20 have been amended. Claim 17 has been amended for clarity to correct a minor grammatical error.

Drawings

The Examiner indicated that Figure 2 should include a legend such as "Prior Art". In the Preliminary Amendment filed April 30, 2004, Applicant enclosed a Replacement drawing sheet for Figure 2, which was amended to indicate "Prior Art."

Specification

The specification has been amended to correct informalities. Applicants note that paragraph 26 has been amended to accurately correspond to Figure 6.

No new matter has been added.

I. Claim Rejections - 35 U.S.C. § 102

Claim 11 stands rejected under 35 U.S.C. § 102(a) as being anticipated by Applicant's admitted prior art (hereinafter "*APA*"). Applicant respectfully traverses the rejection.

The APA in Figure 1 indicates the decimation of a digital signal to convert from a sampling rate of $2f_s$ to a sampling rate of f_s. The delta sigma modulator 108 receives the input signal sampled at f_s. The delta sigma modulator operates at frequency f_s.

Claim 11 has been amended to recite "receiving the input data having a sampling frequency Mf_s at an input of the delta sigma modulator" and "converting the input data into low pass filtered data having a sampled frequency of f_s using an internal filter of the delta-sigma modulator operating at the delta sigma modulator operating frequency of f_s to generate output data." Thus, Claim 11 is different and accordingly not anticipated by the APA because, for example, the frequency of the input data received by the delta sigma modulator in amended

Claim 11 and the operating frequency of the delta sigma modulator are different in amended Claim 11 but are the same in the APA.

Accordingly, Applicants respectfully request withdrawal of the rejection of Claim 11.

II. Claim Rejections - 35 U.S.C. § 103

Claims 1, 5, and 7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,346,898 issued to Melanson (hereinafter "*Melanson*") in view of U.S. Patent No. 6,433,726 issued to Fan (hereinafter "*Fan*").

Referring to Figure 4 of *Melanson*, the analog-to-digital converter (ADC) delta sigma modulator includes a noise shaping filter 101 to filter a difference between the input 102 and digital-to-analog converted quantizer feedback. The multi-level quantizer 404 quantizes the output of the noise shaping filter 101. *Melanson* does not disclose "an input sample rate of input samples to the delta sigma modulator is an integer multiple of an output sample rate of the delta sigma modulator." Claim 1.

Fan discloses a quadrature ADC delta sigma modulator with a primary function of sample rate conversion. Referring to Figures 1 and 2 of *Fan*, the ADC delta sigma modulator 100 has an operating frequency (e.g. 91.8 MHz) that is different than the output sample rate (e.g. 9.8304 MHz). Figure 2 indicates the that the accumulator 230 of decimator 130 using the input sample clock frequency = F1 while the output sample rate frequency = F2 = F1/(N+P/Q).

(A) Initially, Applicants respectfully submit that a *prima facie* case of obviousness has not been made because of insufficient motivation to combine *Melanson* and *Fan.*

To establish obviousness based on a combination of elements disclosed in the prior art or a modification of the prior art, there must be some motivation, suggestion or teaching of the desirability of making the claimed invention. *See In re Dance*, 160 F.3d 1339, 48 USPQ2d 1635, 1637 (Fed. Cir. 1998); *In re Gordon*, 733 F.2d 900, 221 USPQ 1125, 1127 (Fed. Cir. 1984). The motivation, suggestion or teaching may come explicitly from statements in the prior art, the knowledge of one of ordinary skill in the art, or, in some cases, the nature of the problem to be solved. *In re Dembiczak*, 175 F.3d 994, 998, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999).

Broad conclusory statements standing alone are not "evidence" of obviousness. *Id.* Additionally, hindsight is an impermissible basis for establishing a prima facie case of obviousness. W.L. Gore & Assocs. v. Garlock, Inc., 721 F.2d 1540, 1551, 220 USPQ 303, 312-13 (Fed. Cir. 1983). To prevent a hindsight-based obviousness analysis, the Federal Circuit has clearly established that the relevant inquiry for determining the scope and content of the prior art is whether there is a reason, suggestion, or motivation in the prior art or elsewhere that would have led one or ordinary skill in the art to select and modify *Melanson* in accordance with *Fan* so as to render the present invention obvious under 35 U.S.C. § 103. *See Ruiz v. A.B. Chance Co.*, 357 F.3d 1270, 69 USPQ2d (BNA) 1686 (Fed. Cir. Jan. 29, 2004) (In making the assessment of differences, section 103 specifically requires consideration of the claimed invention "as a whole." The "as a whole" instruction in title 35 prevents evaluation of the invention part by part. Without this important requirement, an obviousness assessment might break an invention into its component parts (A + B + C), then find a prior art reference containing A, another containing B, and another containing C, and on that basis alone declare the invention obvious. This form of hindsight reasoning, using the invention as a roadmap to find its prior art components, would discount the value of combining various existing features or principles in a new way to achieve a new result - often the very definition of invention. Section 103 precludes this hindsight discounting of the value of new combinations by requiring assessment of the invention as a whole. This court has provided further assurance of an "as a whole" assessment of the invention under § 103 by requiring a showing that an artisan of ordinary skill in the art at the time of invention, confronted by the same problems as the inventor and with no knowledge of the claimed invention, would select the various elements from the prior art and combine them in the claimed manner. In other words, the examiner or court must show some suggestion or motivation, before the invention itself, to make the new combination.)

Applicants respectfully submit that *Melanson* describes a conventional delta sigma modulator loop filter integrator configuration. *Fan* decimates oversampled data, and the output of *Fan* is the decimated data. The output of *Melanson* is noise-shaped, quantized data. Applicants respectfully submit that the only motivation to decimate and noise-shape data using an internal loop filter of a delta sigma modulator and provide the decimated-noise shaped data to a quantizer is found in the Present Application.

The Examiner identifies the motivation of combining *Melanson* and *Fan* as "to provide a system that selectively varies the output sampling rate such that the average output sampling rate corresponds to the desired output sampling rate." Office Action, p. 3. However, the stated motivation is simply a restatement of the function of all decimators and is, thus, not motivation for "a delta-sigma modulator having an internal filter coupled to a quantizer, wherein … (ii) an input sample rate of input samples to the delta sigma modulator is an integer multiple of an output sample rate of the delta sigma modulator, and (iii) the internal filter and the quantizer of the delta sigma modulator operate at the output sample rate." Claim 1. Applicant also respectfully submits that the stated motivation is not motivation for "processing the received input data [wherein an input sample rate of the input data to the delta sigma modulator is N times *f*] using an internal filter and a quantizer of the delta sigma modulator, wherein the internal filter and the quantizer operate at the frequency *f*, … providing output data quantized by the quantizer at an output sample rate of frequency *f*." Claim 7.

(B) Additionally, Applicants respectfully submit that assuming *arguendo* that the combination of *Melanson* and *Fan* is proper, *Melanson* and *Fan* do not teach or suggest the invention of Claims 1 and 7. Since *Melanson* does not disclose "an input sample rate of input samples to the delta sigma modulator is an integer multiple of an output sample rate of the delta sigma modulator" and *Fan* specifically teaches that the ADC delta sigma modulator 100 has an operating frequency that is different than the output sample rate, *Melanson* in combination with *Fan* cannot teach or suggest "a delta-sigma modulator having an internal filter coupled to a quantizer, wherein … (ii) an input sample rate of input samples to the delta sigma modulator is an integer multiple of an output sample rate of the delta sigma modulator, and (iii) the internal filter and the quantizer of the delta sigma modulator **operate at the output sample rate**." Claim 1. Likewise, *Melanson* in combination with *Fan* cannot teach or suggest "processing the received input data [wherein an input sample rate of the input data to the delta sigma modulator is N times *f*] using an internal filter and a quantizer of the delta sigma modulator, wherein the internal filter and the quantizer operate at the frequency *f*, … providing output data quantized by the quantizer at an output sample rate of frequency *f*." Claim 7.

For at least the above reasons, Applicant respectfully requests withdrawal of the rejection of Claims 1 and 7. Applicant also respectfully requests the withdrawal of dependent Claim 5 for at least the same reason as independent Claim 1.

III. Claim Rejections - 35 U.S.C. § 103

Claims 2-4 and 8-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Melanson* in view of *Fan*, as applied to claim 1, and further in view of *APA*. Applicant respectfully traverses the rejection.

Claim 6 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Melanson* in view of *Fan*, as applied to claim 1, and further in view of U.S. Patent No. 6,271,782 issued to Steensgaard-Madsen (hereinafter "*Steensgaard-Madsen*"). Applicant respectfully traverses the rejection.

Claims 2-4 depend upon Claim 1, and Claims 8-10 depend upon Claim 7. Applicants respectfully request the withdrawal of the rejection of Claims 2-4 for at the same reasons as Claim 1. Applicants respectfully request the withdrawal of the rejection of Claims 8-10 for at the same reasons as Claim 7.

IV. Claim Rejections - 35 U.S.C. § 103

Claims 12-16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *APA* in view of *Steensgaard-Madsen*. Applicant respectfully traverses the rejection.

Claims 12-16 depend upon Claim 11. Applicant respectfully submits that Claim 11 is allowable over the APA, *Melanson*, *Fan*, and *Steensgaard-Madsen*, and, thus, Claims 12-16 are allowable for at least the same reasons as Claim 11.

Steensgaard-Madsen relates in general to a delta sigma modulator. Referring to Figure 8, *Steensgaard-Madsen* teaches a loop filter with series of integrators. The integrators depicted under numbers 116, 118, and 120 receive only one data sample at a time, i.e. the double delayed (z^{-2}) version of g(k). The first integrator clearly receives only 2 inputs, i.e. $g(k)z^{-2}$ and a(k). Only one of these inputs, $g(k)z^{-2}$, is a data sample. The other input, a(k) is feedback. The second and third integration stages receive 3 inputs. However, only one of the inputs, $\alpha_i g(k)z^{-2}$, is a data sample. The second input is an integrator output, and the third input is feedback, $\alpha_i a(k)$.

Applicant references the specific discussion of *Melanson* and *Fan* above and respectfully submits that even assuming *arguendo* that the combination of *Melanson* and *Fan* is proper, *Melanson* in combination with *Fan*, *Steensgaard-Madsen*, and the APA fail to teach or suggest "receiving the input data having a sampling frequency Mf_S at an input of the delta sigma modulator, converting the input data into low pass filtered data having a sampled frequency of f_S using an internal filter of the delta-sigma modulator operating at the delta sigma modulator operating frequency of f_S to generate output data, and quantizing the output data of the internal filter using a quantizer operating at the delta sigma modulator operating frequency of f_S." as recited in Claim 11.

Applicants respectfully submit that since Claim 11 is allowable over APA, *Melanson*, *Fan*, and *Steensgaard-Madsen*, dependent Claims 12-16 are allowable for at least the same reasons as Claim 11. Accordingly, Applicants respectfully request withdrawal of the rejection.

IV. Claim Rejections - 35 U.S.C. § 103

Claim 17 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Fan* in view of *Steensgaard-Madsen*. Applicant respectfully traverses the rejection.

Steensgaard-Madsen relates in general to a delta sigma modulator. Referring to Figure 8, *Steensgaard-Madsen* teaches a loop filter with series of integrators. The integrators depicted under numbers 116, 118, and 120 receive only one data sample at a time, i.e. the double delayed (z^{-2}) version of g(k). The first integrator clearly receives only 2 inputs, i.e. $g(k)z^{-2}$ and a(k). Only one of these inputs, $g(k)z^{-2}$, is a data sample. The other input, a(k) is feedback. The second and third integration stages receive 3 inputs. However, only one of the inputs, $\alpha_i g(k)z^{-2}$, is a data sample. The second input is an integrator output, and the third input is feedback, $\alpha_i a(k)$.

Applicants respectfully submit that a close inspection of *Steensgaard-Madsen, Fan*, and Claim 17 indicates that *Fan* in view of *Steensgaard-Madsen* does not teach or suggest Claim 17.

At any single time, *Steensgaard-Madsen* teaches that only one input to each integration stage is a data sample, *Fan* in view of *Steensgaard-Madsen* fail to teach or suggest "providing first and second **data samples** and first quantizer feedback data **at the same time** to a first integration stage, wherein the first and second data samples provided to the first integration stage are respectively modified by a first gain and a second gain", "providing **the** first and second data samples and second quantizer feedback at the same time to a second integration stage, wherein the second integration stage receives output data **from the first integration stage and the first and second data samples** provided to the second integration stage are respectively modified by a third gain and a fourth gain", and "integrating output data from the second integration stage using N-subsequent integration stages to generate quantizer input data, wherein N is any non-negative integer." Claim 17.

Accordingly, Applicants respectfully request withdrawal of the Claim 17 rejection.

V. Claim Rejections - 35 U.S.C. § 103

Claims 18 and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Fan* in view of *Steensgaard-Madsen* as applied to claim 17, and further in view of *APA*. Applicant respectfully traverses the rejection.

Claims 18 and 19 depend from Claim 17. Applicants respectfully request withdrawal of the rejections of Claims 18 and 19 for at least the same reasons as Claim 17.

VI. Claim Rejections - 35 U.S.C. § 103

Claim 20 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *APA* in view of *Fan*. Applicant respectfully traverses the rejection.

(A) Applicant respectfully submits that the combination of the APA and *Fan* is improper for the same reasons as the combination of *Melanson* and *Fan*. Accordingly, Applicants respectfully submit that Claim 20 is allowable over the APA and *Fan*.

(B) Applicant respectfully submits that even assuming *arguendo* that the combination of the APA and *Fan* is proper, the APA in combination with *Fan* fail to teach or suggest "means for receiving the input data having a sampling frequency Mf_s at an input of the delta sigma modulator, means for converting the input data into low pass filtered data having a sampled frequency of f_S using an internal filter of the delta-sigma modulator operating at the delta sigma modulator operating frequency of f_S to generate output data, and means for quantizing the output data of the internal filter using a quantizer operating at the delta sigma modulator operating frequency of f_S." as recited in Claim 20.

Accordingly, Applicants respectfully request withdrawal of the Claim 20 rejection.

CONCLUSION

In view of the amendments and remarks set forth herein, Applicant respectfully submits that all pending claims are in condition for allowance. Accordingly, Applicant requests that a Notice of Allowance be issued. Nonetheless, should any issues remain that might be subject to resolution through a telephone interview, the Examiner is requested to telephone the undersigned at 512-338-9100.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Mail Stop Amendment, COMMISSIONER FOR PATENTS, PO Box 1450, Alexandria, VA 22313-1450, on February 6, 2006.

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Attorney for Applicant(s) Date of Signature

Respectfully submitted,

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